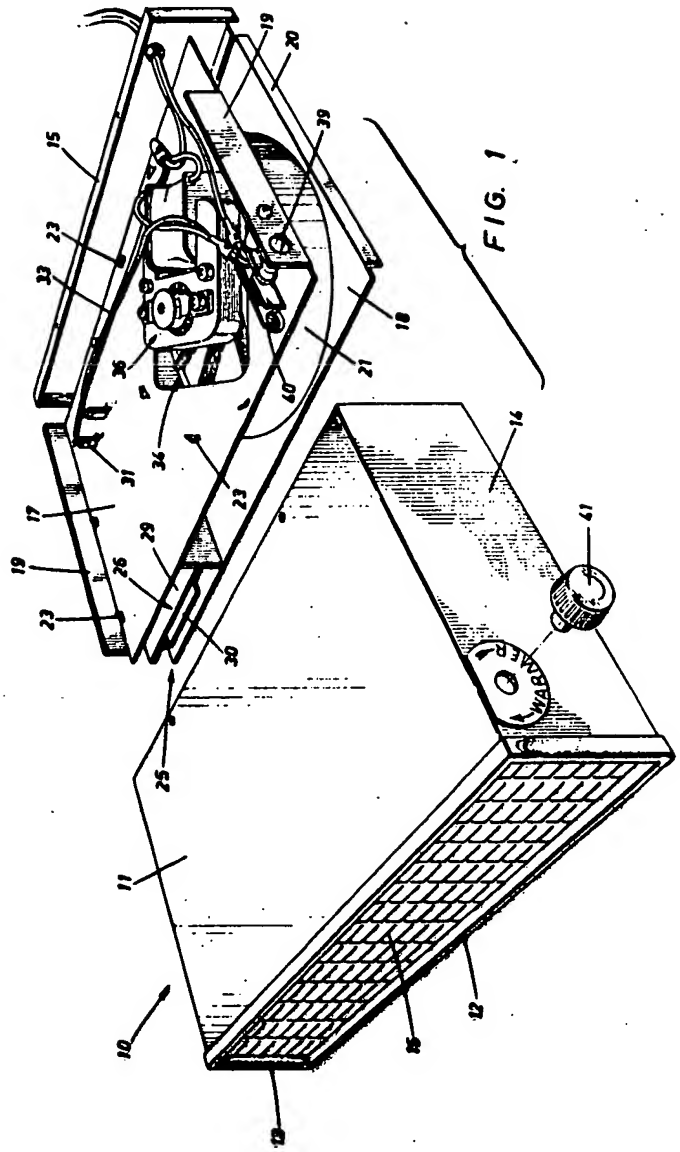

FIG. 1

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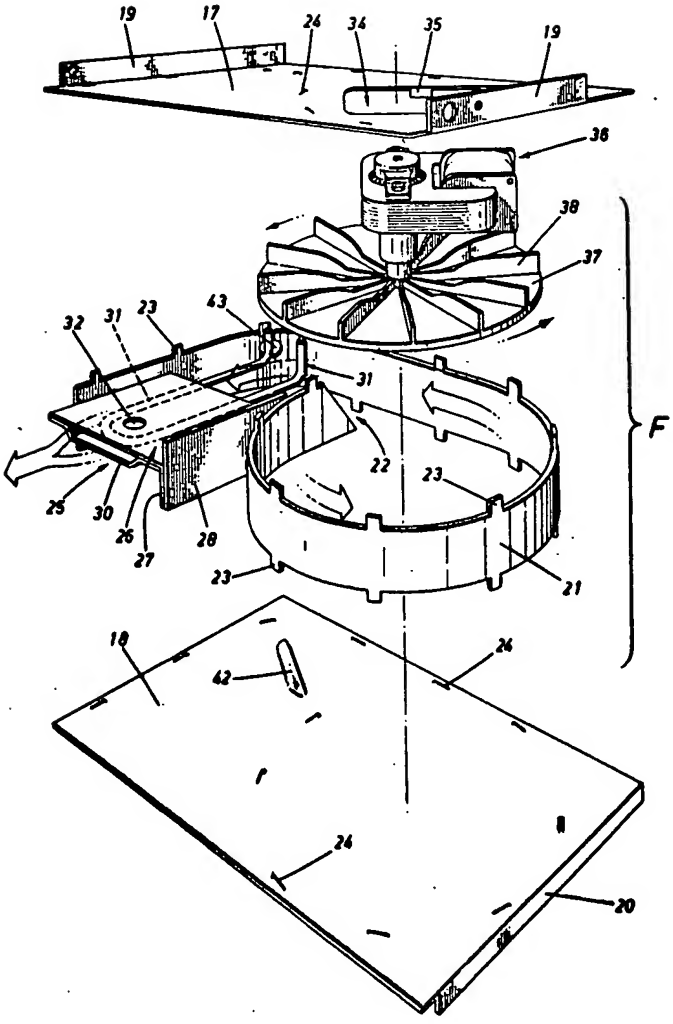

FIG. 2

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CANADA
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CANADIAN PATENT [redacted]

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HOT AIR BLOWER

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No. OF CLAIMS 11

This invention relates to a device for blowing hot air. More particularly, this invention relates to a hot air heater of a type which is compact in nature and which is particularly suited for heating the interior of automobiles which have been left outside overnight in winter, or which have been left overnight in a cold garage. Of course, the heating of the interior of automobiles is but one of the many possible uses for a hot air blower embodying this invention.

In the past, many types of hot air heaters have been devised and used. The most common type are, perhaps, heaters which employ a conventional type of propellor fan which blows cool air across a plurality of coiled, resistance wire elements. This type of hot air heater has a number of disadvantages. For example, such heaters are generally bulky in nature because of the employment of a conventional propellor type fan mechanism. In addition, there is the necessity of employing long lengths of resistance wire to achieve acceptable heat outputs. Furthermore, the coiled, resistance wire heating elements are subject to mechanical failure.

Accordingly, it is one object of this invention to provide an extremely compact hot air blower which makes very efficient use of the space available and yet which is capable of producing a very high heating effect.

It is another object of this invention to provide a hot air blower employing a centrifugal impeller and an electrical heating element preferably of the type wherein the resistance wire is mounted in a sheath and separated therefrom by electrical insulating material.

Yet a further object of this invention is to provide

a hot air blower which includes two spaced-apart plates and a wall extending between the plates, the latter being generally spiral in form. The wall and the plates define a generally spiral chamber, and the wall is affixed between the plates by means of tabs carried on the wall which extend through slots in the plates and which are twisted on the side of the plates remote from the chamber, so as to maintain the wall securely in position between the plates.

Still another object of this invention is to provide a hot air blower having novel cooling means whereby the portions of the housing of the hot air blower which are closely adjacent to the electrical heating element are cooled by a portion of the cool forced air in the spiral chamber of the hot air blower, the portion being permitted to escape from the chamber to achieve the desired result.

In brief, one hot air blower embodying this invention comprises a casing which defines a generally spiral chamber having an open end. A centrifugal impeller is positioned in the chamber remote from the open end of the chamber. An electric motor is connected to and is adapted to drive the impeller. An electrical heating element is positioned in the chamber between the open end thereof and the impeller.

Preferably the casing for the blower comprises two spaced apart plates and a wall extending between the plates, the latter being generally spiral in form. The plates have a plurality of slots therein, and the wall has a plurality of tabs depending therefrom. The tabs pass through the slots and are twisted on the side of the plates remote from the spiral chamber. In this manner the wall is secured in position between the plates.

The foregoing parts of a hot air blower embodying

this invention preferably are located in a housing which has an open side, the open end of the spiral chamber being positioned adjacent the open side of the housing. In order to cool the portions of the housing which are adjacent the electrical heating element, it is desirable to provide an air scoop in one of the plates, the air scoop being positioned between the impeller and the electrical heating element, being adjacent the electrical heating element, and communicating with the spiral chamber, whereby some of the cool forced air in the spiral chamber is adapted to be passed out of the chamber into the space between the one plate and a wall of the housing. For the same purpose it is desirable to provide an opening in the wall between the impeller and the electrical heating element, the opening being positioned adjacent the electrical heating element and communicating with the spiral chamber, so as to permit cool forced air from the chamber to pass out of the chamber and cool a portion of the housing wall adjacent the wall of the spiral chamber.

This invention will become more apparent from the following detailed description, taken in conjunction with the appended drawings, in which:

Figure 1 shows a hot air blower embodying this invention, and

Figure 2 shows the operating part of the blower of Figure 1 in exploded perspective.

Referring now to the drawings, a hot air blower embodying this invention includes a housing 10 which is generally rectangular in nature and which has a top wall 11, a bottom wall 12, end walls 13 and 14, and a side wall 15. The side wall 15 is removable from the remainder of the housing and is detachably secured thereto by any suitable

means. It will be seen that the side of the housing 10 opposite side wall 15 is open and a decorative grille 16 extends thereacross.

Positioned in housing 10 are two plates 17 and 18 which are held in spaced, parallel relationship to one another. Plate 17 has upwardly turned flanges 19, while plate 18 has downwardly turned flanges 20, only one of which is shown. Flanges 19 separate plate 17 from top wall 11, while flanges 20 separate plate 18 from bottom wall 12. It will be seen that flanges 19 are longer than flanges 20, and hence that plate 17 is further from top wall 11 than is plate 18 from bottom wall 12.

Extending between plates 17 and 18 is a wall 21 which is generally spiral in form and which, together with plates 17 and 18, defines a spiral chamber 22. Wall 21 has tabs 23 depending from both side edges thereof. Plates 17 and 18 are provided with slots 24. Tabs 23 fit into slots 24, and, once in these slots, tabs 23 are twisted, as best shown in Figure 1, so as to secure wall 21 in position between plates 17 and 18, which are held in spaced apart, parallel relationship by wall 21, without the necessity of employing any fastening devices such as screws or rivets, or without the necessity of utilizing expensive spot welding procedures. It will be seen that spiral chamber 22 formed by wall 21 and plates 17 and 18 has an open end 25 which is positioned adjacent the open side of housing 10, i.e. the side of housing 10 covered by grille 16.

A generally U-shaped support member 26 extends across chamber 22 adjacent open end 25 thereof and has arms 27, only one of which is shown, which are fastened

to wall 21 and a plate 28 by any suitable means such as spot welding, for example. Plate 28 is spot welded to wall 21. Spot welded to the upper wall 29 of support member 26 is a generally U-shaped support member 30.

A generally U-shaped electrical heating element 31 passes through apertures in top plate 17 and is held in position in the space formed between support member 30 and upper wall 29 of support member 26. Apertures 32 are provided in upper wall 29 and support member 30 adjacent the bight of element 31 so as to preclude hot air from being trapped between upper wall 29 and support member 30. Wires 33 are connected to the free ends of electrical heating element 31. Electrical heating element 31 is of the conventional type comprising a metal tube in which is coaxially mounted a resistance wire, the space between the resistance wire and the metal tube being filled with a suitable electrical insulating material. The employment of such an electrical heating element contributes to the mechanical ruggedness of a hot air blower embodying this invention. In addition, the employment of such an electrical heating element contributes to the enhanced heating effect which can be achieved with a hot air blower embodying this invention.

Provided in plate 17 is a cool air inlet 34, across which extends a motor support 35 on which is mounted a conventional electric motor 36. Located in spiral chamber 22 remote from the open end 25 thereof is a centrifugal impeller 37 which is connected to be driven by electric motor 36 and which has a plurality of upstanding fins 38 formed thereon. Impeller 37 may be made of plastic if desired.

Extending through one of flanges 19 of plate 17 is the shaft 39 of a thermostatic on-off switch 40. Shaft 39 also extends through end wall 14 of housing 10 and has a control knob 41 secured thereto. The thermostatic on-off switch 40 is of a conventional type.

The electric motor 36 and electrical heating element 31 preferably are connected in parallel with each other, both devices being connected in series with thermostatic switch 40. When the thermostatic switch is in the off position, no electrical current is supplied to either electric motor 36 or heating element 31. However, upon turning of knob 41 from the off position, the contacts of the thermostatic switch are connected, thereby permitting the supply of electrical energy from an outside source to heating element 31 and motor 36. Depending upon the setting of control knob 41, the contacts of the switch can be set to open when the ambient temperature is relatively low, or when the ambient temperature is relatively high, thus permitting a full range of heat control.

As best shown in Figure 2, plate 18 is provided with an air scoop 42 which is positioned between impeller 37 and electrical heating element 31, being adjacent electrical heating element 31 and communicating with spiral chamber 22. Part of the cool forced air in chamber 22 is directed from chamber 22 into the space between plate 18 and bottom wall 12, thereby keeping the portion of bottom wall 12 adjacent heating element 31 cool. This same effect is achieved, insofar as top wall 11 is concerned, by the fact that plate 17 is further from top wall 11 than is plate 18 from bottom wall 12, and also because the cool air inlet

34 is provided in plate 17, so that the drawing of cool air into this inlet exerts a cooling effect on top wall 11 of housing 10. An opening 43 is provided in wall 21 between impeller 37 and heating element 31. The opening 43 is adjacent the electrical heating element and communicates with spiral chamber 22. Part of the cool forced air in chamber 22 passes out of chamber 22 through opening 43 and thereby cools the portion of end wall 13 adjacent heating element 31. In this manner housing 10 is kept cool, so as to avoid burning a person handling the same or damaging the surface on which the hot air blower rests.

One feature of a hot air blower embodying this invention is the simplicity of construction. This is achieved by the aforementioned means used to secure wall 21 to and between plates 17 and 18. Furthermore, a hot air blower embodying this invention is readily disassembled for servicing, since plates 17 and 18, and the apparatus associated therewith, are slidably mounted in housing 10 and can be readily removed.

An important feature of this invention is the employment of a centrifugal impeller rather than a rotary propeller type of fan. The employment of a centrifugal impeller materially enhances the compactness of the device. The employment of an electrical heating element of the aforementioned type, rather than a coiled, resistance wire heater, contributes to the mechanical ruggedness of the hot air blower, as aforementioned, although the latter type may be used, of course. At the same time, the use of the former type of heating element permits the attainment of high temperatures.

A further important feature of this invention is

the employment of air scoops and openings positioned in such a manner as to direct cool air against the portions of the housing which would otherwise become very hot due to their proximity to the heating element.

While there has been disclosed herein certain preferred embodiments of this invention, those skilled in the art will appreciate that changes and modifications may be made therein without departing from the spirit and scope of this invention as defined in the appended claims.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A hot air blower comprising two spaced apart plates, a wall extending between said plates and being generally spiral in form, said wall and said plates defining a generally spiral chamber having an open end, said plates having a plurality of slots therein, said wall having a plurality of tabs depending therefrom, said tabs passing through said slots and being twisted on the sides of said plates remote from said chamber, whereby said wall is secured in position between said plates, a centrifugal impeller positioned in said chamber remote from said open end, an electric motor connected to and adapted to drive said impeller, and an electric heating element positioned in said chamber between said open end of said chamber and said impeller.

2. A hot air blower comprising a housing having an open side, two spaced apart plates positioned inside said housing and spaced therefrom and at least substantially parallel to each other, a wall extending between said plates and being generally spiral in form, said wall and said plates defining a generally spiral chamber having an open end, said open end of said chamber being positioned adjacent said open side of said housing, said plates having a plurality of slots therein, said wall having a plurality of tabs depending therefrom, said tabs passing through said slots and being twisted on the sides of said plates remote from said chamber, whereby said wall is secured in position between said plates, a centrifugal impeller positioned in said chamber remote from said open end, an electric motor connected to and adapted to drive said

impeller, and an electric heating element positioned in said chamber between said open end of said chamber and said impeller.

3. A hot air blower according to claims 1 or 2 including a thermostatic on-off switch controlling the supply of electrical energy to said motor and said electric heating element.

4. A hot air blower according to claims 1 or 2 including two spaced apart chamber-defining plates positioned between said plates and adjacent said open end of said chamber, said electric heating element being positioned in the chamber formed between said chamber-defining plates.

5. A hot air blower according to claim 1 including a thermostatic on-off switch controlling the supply of electrical energy to said motor and said electric heating element and including two spaced apart chamber-defining plates positioned between said plates and adjacent said open end of said chamber, said electric heating element being positioned in the chamber formed between said chamber-defining plates.

6. A hot air blower according to claims 1, 2 or 5 wherein one of said plates has an air scoop therein positioned between said impeller and said electric heating element and communicating with said chamber, whereby some of the cool forced air in said chamber is adapted to be passed out of said chamber and over said one plate.

7. A hot air blower according to claims 1, 2 or 5 wherein one of said plates has an air scoop therein positioned between said impeller and said electric heating element and communicating with said chamber, whereby some

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of the cool forced air in said chamber is adapted to be passed out of said chamber and over said one plate, and wherein said wall has an opening therein positioned between said impeller and said electric heating element and communicating with said chamber, whereby some of the cool forced air in said chamber is adapted to be passed out of said chamber.

8. A hot air blower comprising two spaced apart plates, a wall extending between said plates and being generally spiral in form, said wall and said plates defining a generally spiral chamber having an open end, said plates having a plurality of slots therein, said wall having a plurality of tabs depending therefrom, said tabs passing through said slots and being twisted on the sides of said plates remote from said chamber, whereby said wall is secured in position between said plates, a centrifugal impeller positioned in said chamber remote from said open end, an electric motor connected to and adapted to drive said impeller, and an electrical heating element positioned in said chamber between said open end of said chamber and said impeller, one of said plates having an air scoop therein positioned between said impeller and said electrical heating element and communicating with said chamber, whereby some of the cool forced air in said chamber is adapted to be passed out of said chamber and over said one plate.

9. A hot air blower comprising a housing having an open side, two spaced apart plates positioned inside said housing and spaced therefrom and at least substantially parallel to each other, a wall extending between said plates and being generally spiral in form, said wall

and said plates defining a generally spiral chamber having an open end, said open end of said chamber being positioned adjacent said open side of said housing, said plates having a plurality of slots therein, said wall having a plurality of tabs depending therefrom, said tabs passing through said slots and being twisted on the sides of said plates remote from said chamber, whereby said wall is secured in position between said plates, a centrifugal impeller positioned in said chamber remote from said open end, an electric motor connected to and adapted to drive said impeller, and an electrical heating element positioned in said chamber between said open end of said chamber and said impeller, one of said plates having an air scoop therein positioned between said impeller and said electrical heating element and communicating with said chamber, whereby some of the cool forced air in said chamber is adapted to be passed out of said chamber and over said one plate.

10. A hot air blower according to claims 8 or 9 wherein said wall has an opening therein positioned between said impeller and said electrical heating element and communicating with said chamber, whereby some of the cool forced air in said chamber is adapted to be passed out of said chamber.

11. A hot air blower comprising a housing having an open side, two spaced apart plates positioned inside said housing and spaced therefrom, a wall extending between said plates and being generally spiral in form, said wall and said plates defining a generally spiral chamber having an open end, said open end of said chamber being positioned adjacent said open side of said housing, said plates having a plurality of slots therein, said wall

having a plurality of tabs depending therefrom, said tabs passing through said slots and being twisted on the sides of said plates remote from said chamber, whereby said wall is secured in position between said plates, a centrifugal impeller positioned in said chamber remote from said open end, an electric motor connected to and adapted to drive said impeller, and an electrical heating element positioned in said chamber intermediate said open end and said impeller, one of said plates having an air scoop therein positioned between said impeller and said electrical heating element, said air scoop being adjacent said electrical heating element and communicating with said chamber, whereby some of the cool forced air in said chamber is adapted to be passed out of said chamber to cool a portion of said housing adjacent said electrical heating element, said wall having an opening formed therein between said impeller and said electrical heating element, said opening being adjacent said electrical heating element and communicating with said chamber, whereby some of the cool forced air in said chamber is adapted to be passed out of said chamber to cool a portion of said housing adjacent said electrical heating element, the other of said plates having a cool air inlet formed therein, said inlet communicating with said impeller, one wall of said housing being positioned adjacent said one plate, an other wall of said housing being positioned adjacent said other plate, said other plate being positioned further from said other wall of said housing than said one plate is positioned from said one wall of said housing.

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